

**PATENT**

Atty Docket No.: 200205522-1

App. Ser. No.: 10/675,944

**REMARKS**

Favorable reconsideration of this application is respectfully requested in view of the claim amendments and following remarks.

By virtue of the amendments above, Claims 1, 4, 5, 14, 16, 17, and 20 have been amended and Claim 23 has been added. Accordingly, Claims 1-12, 14-20, 22, and 23 remain pending in the present application, of which Claims 1, 14, and 22 are independent.

No new matter has been introduced by way of the claim amendments or addition; entry thereof is therefore respectfully requested.

**Allowable Subject Matter**

The indication that Claim 22 is allowed is noted with appreciation.

The indication that Claims 4-12 and 16-20 would be allowable if rewritten to include all of the limitations of the base claim and any intervening claims is also noted with appreciation. It is respectfully submitted that all of the pending claims are allowable over the cited documents of record for at least the reasons discussed herein below. As such, none of these claims have been rewritten to include all of the features of respective base claims and any intervening claims.

**Requirement for Information**

The Official Action asserts that the Applicant and the assignee of this application are required under 37 CFR 1.105 to provide information that the examiner has determined is reasonably necessary to the examination of this application. The Official Action, more particularly, requests whether any search of prior art was performed and whether the search

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resulted in art that "was considered material to demonstrating the knowledge of a person having ordinary skill in the art to the disclosed Retinex method." If such art existed, the Official Action requests for a copy of that art.

Initially, it is not at all understood as to why the Examiner has requested this information from the Applicants and the assignee of this application. As evidenced by the documents cited in the Information Disclosure Statement ("IDS") submitted on February 9, 2004, it is respectfully submitted that the Applicants have submitted any documents they deemed material to this application. The Examiner has indicated that all of these documents have been considered with respect to the Official Action dated November 17, 2006.

Secondly, it is not at all clear what the Examiner means by "considered material to demonstrating the knowledge of a person having ordinary skill in the art to the disclosed Retinex method." More particularly, what types of documents is the Examiner seeking to find here? Clearly, some of the documents cited in that IDS discuss the Retinex algorithm. In addition, the Retinex algorithm, as understood by the Applicants, has been described in the background section of the present application. As such, it appears that the Applicants have provided all of the information they deemed material to this invention.

In addition, the Official Action has requested that Applicants submit copies of any foreign rejections that used the results of a prior art search. The Applicants have received the written opinion of the International Search Authority, which is attached at the end of the present Response. All but one of the references cited in that Search Report have been submitted with the IDS filed on April 7, 2005. The only reference cited in the Search Report that was not cited in that IDS is the publication to Durand, entitled "Fast Bilateral Filtering

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for the Display of High-Dynamic-Range Images". The Durand publication was not cited in the April 7, 2005 IDS because it was already cited in the IDS submitted on February 9, 2004.

For at least the foregoing reasons, it is respectfully submitted that the Applicants have complied with their duty to disclose any materials they deem material to their invention. Accordingly, the Examiner is respectfully requested to withdraw the requirement for information.

**Drawings**

The Official Action objects to the drawings as allegedly failing to show every feature specified in the claims. Specifically, the Official Action asserts that the method steps of Claims 14-20 and 22 must be shown and has thus required corrected drawing sheets. The Examiner is respectfully requested to reconsider this objection because the method steps claimed in Claims 14-20 and 22 are clearly shown in the originally filed drawings as identified in at least the following reasons.

With respect first to independent Claim 14, it is respectfully submitted that Figure 3 explicitly shows the steps recited therein. More particularly, Figure 3 shows a block diagram having a plurality of arrows that depict the directions in which data, at various stages, flows in the figure. In this regard, Figure 3 can reasonably be interpreted as being similar to a flow or process diagram. This interpretation is further supported by the description of the modules depicted in Figure 3. Figures 4a, 4b, 5a-5c, 7a, and 7b also show flow or process diagrams that more specifically define some of the processes described with respect to Figure 3.

With respect first to the step of "producing one or more low resolution input images...", the high resolution input image is depicted and disclosed as the letter "S" which

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is inputted into the down-sampling module 110, "which receives the input signal S and performs down-sampling according to a down-sampling algorithm (not shown in Figure 3) to produce one or more sub-sampled images S'." *Specification*, page 5, lines 28-31. In addition, with respect to the step of "generating an interim illumination estimation...", the sub-sampled images S' are depicted as being input into the non-linear illumination estimation module 120, "which produces an interim illumination estimation L' for each of the sub-sampled images S'." *Specification*, page 5, lines 31-33. Moreover, with respect to the step of "generating an illumination estimation...", the interim illumination estimations L' are depicted as being input into an up-sampling module 140, "which uses an up-sampling algorithm (not shown in Figure 3) to produce a full size illumination estimation L'," wherein the input image is combined with the interim illumination estimations. *Specification*, bridging sentence of pages 5 and 6 and page 6, lines 31-33.

Furthermore, Figure 3 shows the step of producing a Retinex-corrected output ("R") from the combined input image (S) and the illumination estimation L'. The combination of input image (S) and the illumination estimation L' is clearly shown as the arrows labeled "S" and "L'" in Figure 3. *Specification*, page 6, lines 1-4.

With respect to Claim 15, it is further respectfully submitted that Figures 3 and 4a, collectively, depict the subject matter claimed therein. This is clearly evidenced by the disclosure contained in lines 7-10 on page 7 of the *Specification*. That section, more particularly, describes, with reference to Figure 4a, that "when the estimated illumination L is an envelope rather than an average...the envelope constraint is enforced using the maximum routine 154."

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With respect to Claim 16, the steps claimed therein are depicted in Figure 4b, which shows a method in which one or more low resolution images and the interim illumination estimations are subtracted by the adder 153, where the differences are inputted into an interpolation module 152, and the illumination estimation and the input image are added by the adder 155. *Specification*, page 7, lines 11-20.

With respect to Claim 17, the steps claimed therein are depicted in Figures 5a-5c. More particularly, Figure 5a depicts a difference interpolated illumination estimation, Figure 5b depicts an illumination interpolated illumination, and Figure 5c depicts an average of the curves depicted in Figures 5a and 5b. *Specification*, page 7, line 21 to page 8, line 2.

With respect to Claim 18, the steps claimed therein are depicted in Figure 7a. More particularly, Figure 7a shows that weighting factors ( $W_D$ ) and ( $W_I$ ) are respectively applied to the difference interpolation difference interpolation and the illumination interpolation. *Specification*, page 9, lines 1-5.

With respect to Claim 19, the steps claimed therein are also depicted in Figure 7a.

With respect to Claim 20, the steps claimed therein are depicted in Figure 7b. More particularly, Figure 7b shows that a different interpolation module 150'' is implemented and that an illumination interpolation weighting factor module 150' is applied. *Specification*, page 9, lines 6-8.

With respect to Claim 20, Figure 3 shows all of the steps claimed therein as discussed above with respect to Claim 14. In addition, Figure 7a shows the step of averaging the illumination interpolated illumination estimation and the difference interpolated illumination estimation to produce the illumination estimation.

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For at least the foregoing reasons, it is respectfully submitted that the drawings of the present application clearly show all of the features claimed in Claims 14-20 and 22. The Examiner is therefore respectfully requested to withdraw the objection drawing objections.

**Claim Objections**

Claims 4, 5, 16, and 17 have been objected to as containing informalities. Claims 4, 5, 16, and 17 have been amended in minor respects as suggested in the Official Action, thus obviating the objections. The Examiner is therefore respectfully requested to withdraw the objections to Claims 4, 5, 16, and 17.

**Claim Rejection Under 35 U.S.C. §103**

The test for determining if a claim is rendered obvious by one or more references for purposes of a rejection under 35 U.S.C. § 103 is set forth in MPEP § 706.02(j):

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art and not based on applicant's disclosure. *In re Vaack*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Therefore, if the above-identified criteria are not met, then the cited reference(s) fails to render obvious the claimed invention and, thus, the claimed invention is distinguishable over the cited reference(s).

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Claims 1-3, 14, and 15 have been rejected under 35 U.S.C. § 103(a) as allegedly being obvious over U.S. Patent No. 6,941,028 to Kimmel et al. in view of allegedly admitted prior art. This rejection is respectfully traversed for at least the following reasons.

Claim 1 of the present invention, as amended includes, *inter alia*, a non-linear illumination estimation module and an up-sampling module that is "configured to receive the input image and to interpolate the interim estimations to produce an illumination estimation by using the input image as a guide in the interpolation." Support for these amendments may be found in Figure 3 and in the discussion contained on page 6, lines 31-33. Likewise, Claim 14 of the present invention recites, *inter alia*, that an illumination estimation suitable for Retinex-type correction is generated by combining the input image (S) and the interim illumination estimations (L').

The Official Action focuses its rejection of Claims 1 and 14 on the non-linear illumination estimation module 120 depicted in Figure 3 of the present application. The Official Action, more particularly, asserts that the discussion contained in column 3, lines 14-40 of Kimmel et al. discloses a non-linear illumination estimation module. Regardless of whether this assertion is accurate, it is respectfully submitted that Kimmel et al. fails to teach or suggest that an up-sampling module receives an input image and uses the input image as a guide in interpolating interim illumination estimations to produce an illumination estimation as recited in Claim 1. In addition, Kimmel et al. fails to disclose that generating an illumination estimation suitable for Retinex-type correction includes combining the input image and interim illumination estimations, as recited in Claim 14.

The use of the input image S in generating an illumination estimation L" is at least depicted in Figure 3 by the arrow labeled "S" being inputted into the up-sampling module

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140. In contrast, and as shown in Figure 2, which depicts a conventional Retinex-type algorithm discussed on page 2, line 32 to page 3, line 9 of the present *Specification*, an up-sample module 34 receives the illumination  $L'$ , but does not receive the input image  $S$ .

Therefore, in comparing Figure 3 and Figure 2 of the present application, not only does the illumination estimation module 120 differ from the illumination estimation module 30, but the inputs provided into the up-sample module 140 differ from the input provided into the up-sample module 34. The Official Action is silent as to whether Kimmel et al. discloses the latter feature. In addition, the sections cited in Kimmel et al. by the Official Action do not appear to teach or suggest the inputting of an input image into an up-sampling module along with illumination estimations.

As such, even if one of ordinary skill in the art were somehow motivated to modify the disclosure contained in Kimmel et al. with the information described in Figure 2 of the present application as proposed in the Official Action, the proposed combination would at least still fail to disclose that an input image is used by an up-sampling module to interpolate interim illumination estimations to produce an illumination estimation as claimed in Claim 1. In addition, the proposed combination fails to teach or suggest generating an illumination estimation suitable for Retinex-type correction, wherein generating the illumination estimation comprises combining the input image and the interim illumination estimations as claimed in Claim 14.

For at least these reasons, it is respectfully submitted that Kimmel et al., considered singly or in combination with the block diagram shown in Figure 2, fails to teach or suggest every element claimed in independent Claims 1 and 14. The Official Action has therefore



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failed to establish a prima facie case of obviousness and independent Claims 1 and 14 are allowable over the combination proposed in the Official Action.

Accordingly, the Examiner is respectfully requested to withdraw the rejection of independent Claims 1 and 14 and to allow these claims. Claims 2, 3, and 15 are also allowable over the cited documents of record at least by virtue of their respective dependencies upon allowable independent claims.

Newly Added Claim

New Claim 23 has been added to further define the scope of the invention. Claim 23 is a reiteration of Claim 13, which was canceled in the previous response, and is therefore allowable over the cited documents of record at least by virtue of its dependence upon allowable independent Claim 1.

Conclusion

In light of the foregoing, withdrawal of the rejections of record and allowance of this application are earnestly solicited.

Should the Examiner believe that a telephone conference with the undersigned would assist in resolving any issues pertaining to the allowability of the above-identified application, please contact the undersigned at the telephone number listed below.

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Please grant any required extensions of time and charge any fees due in connection with this request to deposit account no. 08-2025.

Respectfully submitted,

Dated: June 19, 2007

By



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